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# *Indian Standard*

# SPECIFICATION FOR SHIP'S ORDINARY RECTANGULAR WINDOWS

## PART III POSITIONING

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**INDIAN STANDARDS INSTITUTION**
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# Indian Standard

# SPECIFICATION FOR SHIP'S ORDINARY RECTANGULAR WINDOWS

## PART III POSITIONING

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# *Indian Standard*

# SPECIFICATION FOR SHIP'S ORDINARY RECTANGULAR WINDOWS

## PART III POSITIONING

## 0. FOREWORD

**0.1** This Indian Standard ( Part III ) was adopted by the Indian Standards Institution on 30 March 1979, after the draft finalized by the Shipbuilding Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

**0.2** The positioning of rectangular windows on ships intended for international voyage assume greater importance for their safe and efficient functioning. The safe position of the windows is dependent on their strength relative to external forces acting upon the ship. Therefore, there is a need for adopting a standard practice for calculating the design pressure heads to be observed when positioning the windows.

**0.3** As a guidance, the graphs for positioning of rectangular windows are given in Appendix B. This appendix is based on the calculation method for design pressure heads, given in Appendix A, but is presented in a simplified graphical form.

**0.4** This standard has been formulated on the basis of the recommendation of ISO/DIS 5779 Ships' ordinary rectangular windows — Positioning, issued by the International Organization for Standardization ( ISO ) which takes into account the unified requirements of the International Association of Classification Societies ( IACS ).

## 1. SCOPE

**1.1** This standard ( Part III ) specifies the positioning of ship's ordinary rectangular windows of Types E and F conforming to IS : 8886 ( Part I )-1978*, applicable for ocean going ships of all types intended for international voyages.

## 2. REQUIREMENTS

**2.1** No rectangular window shall be installed below the free-board deck or in the first tier or structures whose sides are within 1·2 m from the ship's side.

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*Specification for ship's ordinary rectangular windows: Part I Types and dimensions.

**2.2** In first-tier deck-houses which give access to spaces below the freeboard deck, every rectangular window shall be protected by a permanently attached shutter.

**2.3** Every rectangular window in spaces in the second tier which give direct access to closed first-tier structures or to spaces below the freeboard deck shall be protected by a permanently attached shutter.

NOTE — Shutters are not components of the standardized rectangular windows according to IS : 8886 ( Part I )-1978*; they are additional components which are fitted on the outside.

**2.4** The lowest permissible position of rectangular windows shall be determined on the basis of the strength requirement of the windows related to the external forces acting upon the ship.

**2.4.1** The expected maximum external forces ( design pressure heads ) shall be calculated by the method given in Appendix A.

**2.5 Ultimate Position** — No rectangular windows shall be installed in any part of the ship where the calculated pressure ( working pressure ) exceed the maximum allowable pressure head given in Table 1, which individual types and sizes of windows can withstand.

### TABLE 1 MAXIMUM ALLOWABLE PRESSURE FOR RECTANGULAR WINDOWS

| NOMINAL SIZE mm × mm | TYPE E | TYPE F |
|---|---|---|
| | Maximum Pressure Head m* | |
| 300 × 425 | 9·9 | 6·3 |
| 355 × 500 | 7·1 | 4·5 |
| 400 × 560 | 8·0 | 3·6 |
| 450 × 630 | 6·3 | 2·8 |
| 500 × 710 | 8·0 | 3·6 |
| 560 × 800 | 6·4 | 2·8 |
| 900 × 630 | 8·1 | 3·2 |
| 1 000 × 710 | 6·4 | 2·5 |
| 1 100 × 800 | — | 3·1 |

*1m of water column ≈ 1 N/cm².

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*Specification for ship's ordinary rectangular windows: Part I Types and dimensions.

# APPENDIX A

( *Clauses* 0.3 *and* 2.4.1 )

## CALCULATION OF DESIGN PRESSURE HEADS

### A-1. CALCULATION

**A-1.1** The design pressure head $h$ is given in metres of water column by the following formula:

$$h = a\ (bf - y)\ c$$

where

$a$ = height factor ( *see* **A-1.2** );
$b$ = factor for distribution over the ships' length ( *see* **A-1.3** );
$f$ = the probability factor ( *see* **A-1.4** );
$y$ = vertical distance, in metres, from the summer load waterline to the centre of the window; and
$c$ = breadth factor ( *see* **A-1.5** ).

NOTE 1 — This formula, applying generally to the calculated load to which superstructure and deck-houses may be exposed when protecting openings according to the regulation 18 of the International Loadline Convention 1966, is taken as a basis for the positioning of ships' rectangular windows.

NOTE 2 — This formula also conforms to Unified Requirements of the International Association of Classification Societies ( IACS ).

**A-1.2 Height Factor** — The height factor $a$ shall be calculated in accordance with Table 2.

**A-1.3 Factor** $b$ — Factor $b$ for distribution overship's length shall be calculated in accordance with Table 3.

**A-1.3.1** *Block Coefficient* $C_b$ — The block coefficient $C_b$ is the moulded block coefficient at loaded moulded draught $d$ corresponding to summer load waterline, based on length $L$ and moulded breadth $B$:

$$C_b = \frac{\text{moulded displacement at draught } d}{L \times B \times d}$$

where moulded displacement is expressed in m$^3$ and $L$, $B$ and $d$ in m.

The values to be taken for $C_b$ range from 0·60 to 0·80. When determining aft ends forward of amidships, $C_b$ need not be taken less than 0·80.

**A-1.4 Probability Factor** $f$ — The probability factor $f$ shall be calculated in accordance with Table 4 and Fig. 1.

## TABLE 2 FORMULAE FOR FACTOR *a*

( *Clause* A-1.2 )

| Position of window in superstructures and deck-houses | | *a* | Remarks |
|---|---|---|---|
| Fronts, unprotected | Lowest tier | $2{\cdot}0 + \frac{L_1}{120}$ | *See* Note 1 |
| | Second tier | $1{\cdot}0 + \frac{L_1}{120}$ | — |
| | Third tier | $0{\cdot}5 + \frac{L_1}{150}$ | — |
| Fronts, protected | | | |
| Sides | | | |
| Aft ends | Aft of amidships | $0{\cdot}7 + \frac{L_1}{1\,000} - 0{\cdot}8\,\frac{X}{L}$ | *See* Note 2 |
| | Forward of amidships | $0{\cdot}5 + \frac{L_1}{1\,000} - 0{\cdot}4\,\frac{X}{L}$ | |

where

$L$ = length of the ship, in m, on the summer load waterline from the foreside of stem to the after side of the rudder post, or the centre of the rudder stock if there is no rudder post.

$L_1$ = length of the ship, in m, not to be taken greater than 300 m.

NOTE 1 — The lowest tier is normally that tier which is directly situated above the uppermost continuous deck to which the rule depth $D$ is to be measured. However, where the freeboard is excessive, it may be left to each individual classification society to define this tier as an upper tier. It is recommended that 'excessive freeboard' be that which exceeds the minimum tabular freeboard by more than one standard superstructure height.

NOTE 2 — The letter $X$ stands for the distance, in metres, between the bulkhead considered and the aft perpendicular ( AP ). When determining the dimensions of a deck-house, the deck-house shall be subdivided into parts of approximately equal length, not exceeding $0{\cdot}15\,L$ each, and $X$ shall be taken as the distance between AP and the centre of each part considered.

**TABLE 3 FORMULAE FOR FACTOR *b***

( *Clause* A-1.3 )

| $X/L$ | $b$ |
|---|---|
| $\leqslant 0{\cdot}45$ | $1{\cdot}0 + \left(\frac{X/L - 0{\cdot}45}{C_b + 0{\cdot}2}\right)^2$ |
| $\geqslant 0{\cdot}45$ | $1{\cdot}0 + 1{\cdot}5\left(\frac{X/L - 0{\cdot}45}{C_b + 0{\cdot}2}\right)^2$ |

**A-1.4.1** Figure 1 gives the calculated values for factor $f$.

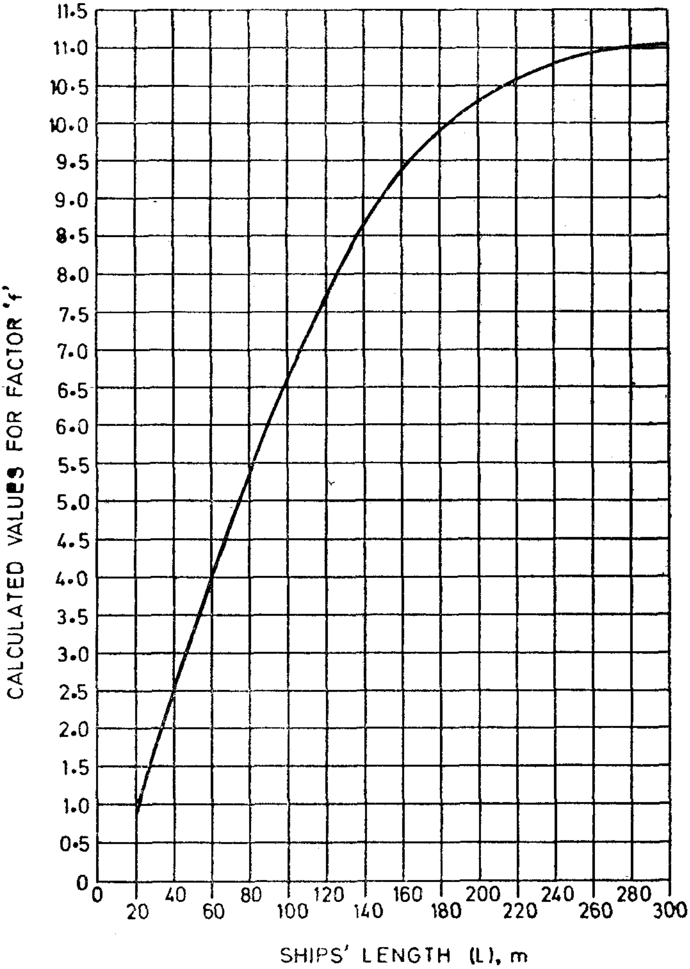


FIG. 1 CALCULATED VALUES OF FACTOR $f$

**TABLE 4 FORMULAE FOR FACTOR *f***

( *Clause* A-1.4 )

| $L$<br>m | $f$ |
|---|---|
| Up to 150 | $\frac{L}{10} e^{-L/300} - \left[ 1 - \left( \frac{L}{150} \right)^2 \right]$ |
| 150 and above up to 300 | $\frac{L}{10} e^{-L/300}$ |
| 300 and above | 11·03 |

**A-1.5** The breadth factor $c$ shall be calculated in accordance with the following formula:

$$c = 0{\cdot}3 + 0{\cdot}7 \frac{b'}{B'}$$

where

$b'$ = breadth, in m, of the deck-house at the position considered; and

$B'$ = actual maximum breadth, in m, of the ship on the exposed weather deck at the position considered.

$b'/B'$ is not to be taken less than 0·25.

## A-2. MINIMUM DESIGN PRESSURE HEAD

**A-2.1** Where a calculated value is less than 2·5 m a pressure head of 2·5 m shall be taken.

# APPENDIX B

( *Clause* 0.3 )

## GRAPHS FOR POSITIONING OF RECTANGULAR WINDOWS

## B-1. GENERAL

**B-1.1** Graphs 1 to 4 may be used to determine the admissible type of rectangular windows, according to IS : 8886 ( Part I )-1978* depending on their position in the ship.

---

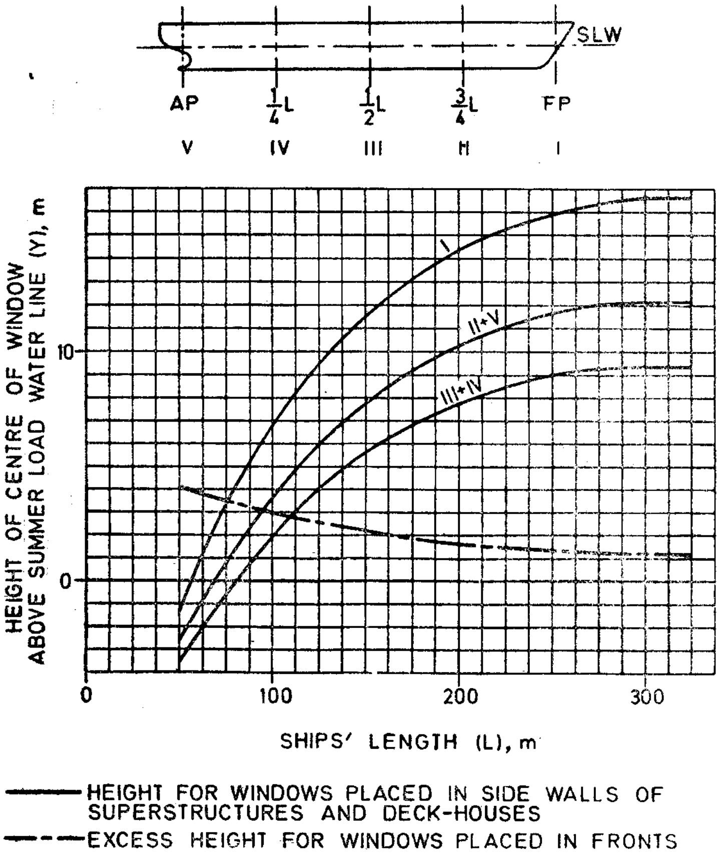
*Specification for ship's ordinary rectangular windows: Part I Types and dimensions.

**B-1.2** From the graphs, the minimum height from the summer load waterline ( SLW ) to the centre of the rectangular window can be derived.

**B-1.3** The curves given in graphs are based on the lowest pressure head which a particular type of window can withstand. These values are given in Table 5.

**B-1.3.1** Graphs 1 and 2 apply to rectangular windows Type E, IS : 8886 ( Part I )-1978*.

**B-1.3.2** Graphs 3 and 4 apply to rectangular windows Type F, IS : 8886 ( Part I )-1978*.



GRAPH 1

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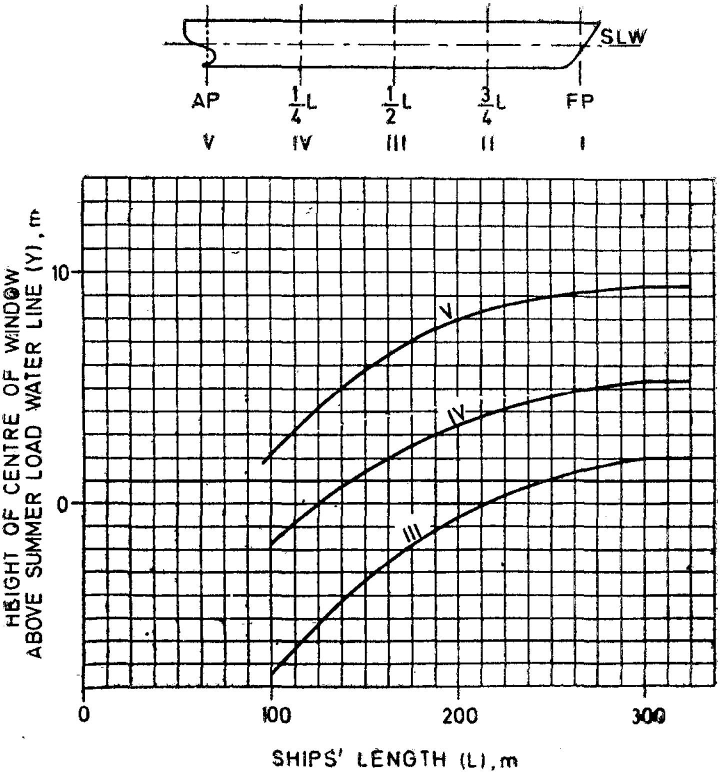
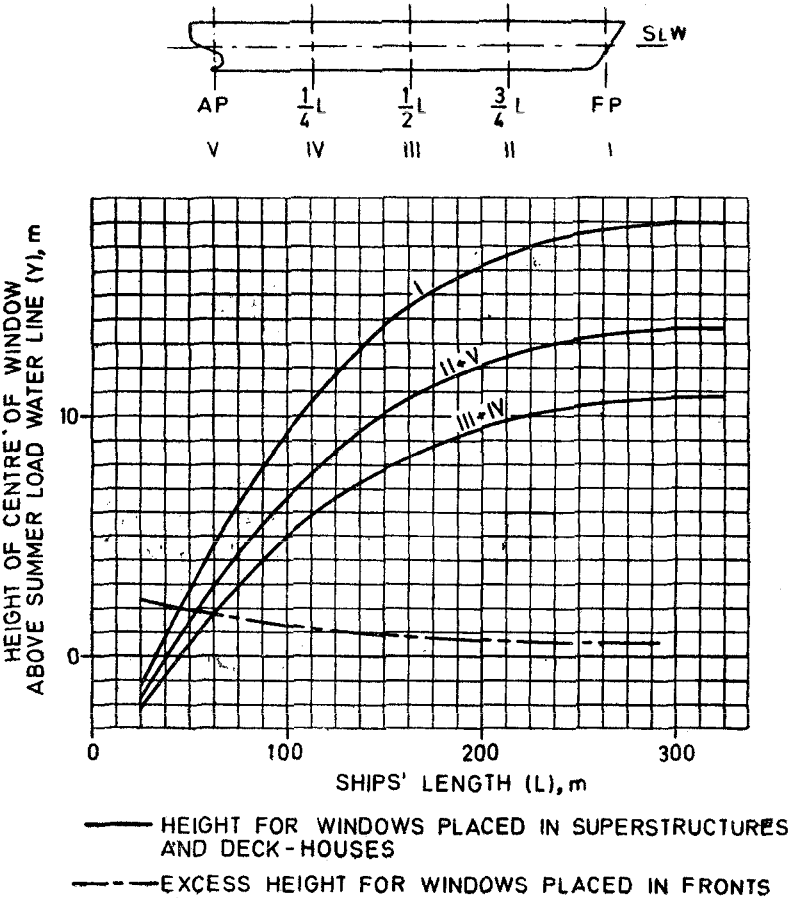
*Specification for ship's ordinary rectangular windows: Part I Types and dimensions.

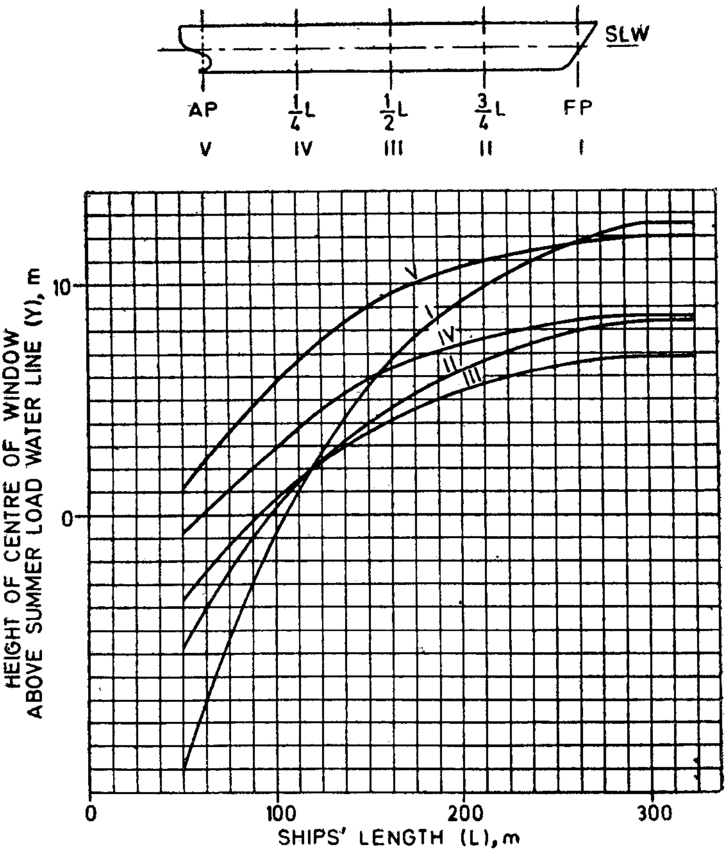


—— HEIGHT FOR WINDOWS PLACED IN AFT ENDS

GRAPH 2


SLW
AP
$\frac{1}{4}$L
$\frac{1}{2}$L
$\frac{3}{4}$L
FP
V
IV
III
II
I
HEIGHT OF CENTRE OF WINDOW ABOVE SUMMER LOAD WATER LINE (Y), m
10
0
100
200
300
SHIPS' LENGTH (L), m
I
II+V
III+IV
HEIGHT FOR WINDOWS PLACED IN SUPERSTRUCTURES AND DECK-HOUSES
EXCESS HEIGHT FOR WINDOWS PLACED IN FRONTS

Graph 3



—— HEIGHT FOR WINDOWS PLACED IN AFT ENDS

GRAPH 4

TABLE 5 PRESSURE HEADS

( *Clause* B-1.3 )

| Window Type | Pressure Head<br>m* |
|---|---|
| E | 6 |
| F | 2·5 |

*1 m of water column ≈ 1 N/cm².

## B-2. DIRECTIONS FOR USING THE GRAPHS

**B-2.1** A scale drawing ( general arrangement plan, profile drawing of capacity plan or similar ) shall be used.

**B-2.2** The lengthwise position of each of the ordinates I to V shall be indicated on the plan ( *see* Fig. 2 ).

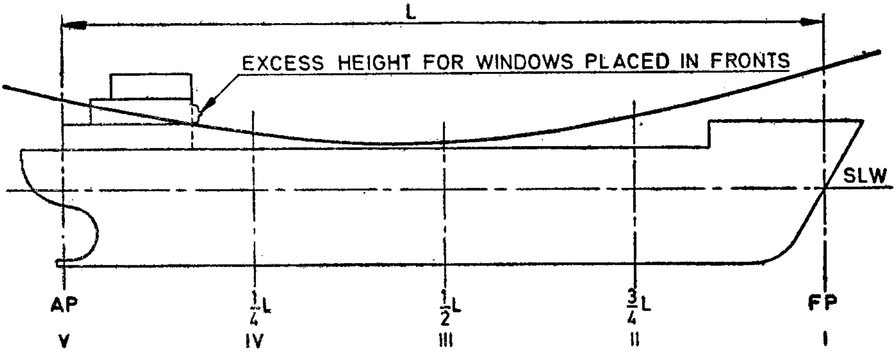


FIG. 2 POSITIONING OF WINDOWS

**B-2.3** The ordinate value, that is, the height above the summer load water-line ( SLW ), shall then be plotted for the type of window being considered ( these values are obtained from either Graph 1 or Graph 3 ).

**B-2.4** A line shall be drawn through the plotted ordinates. This line will be the lowest possible position of the centre of windows of the particular type.

**B-2.5** For windows in fronts, the chain-dotted lines in the Graphs 1 and 3 give the additional height which should be added to the applicable curve referred to in **B-2.4.** The resulting height then becomes the lowest possible position of the centre of windows of the particular type when situated in front of structures.

**B-2.6** For windows of Types E and F, used in aft ends of ships, Graphs 2 and 4 give the actual ordinates. The procedure to be followed is the same as that given in **B-2.2** to **B-2.4**.

NOTE 1 — The particular limitation notified in **B-2.5** shall be observed.

NOTE 2 — The most unfavourable block coefficient ( $C_b = 0{\cdot}6$ ) has been chosen for all ship's lengths. Particularly for the extreme ordinate I and to some extent also for ordinate V, the difference between the lowest and highest values of the height above summer load waterline is about 3 m and 1 m respectively for a variation of $C_b$ from 0·6 to 0·8.

NOTE 3 — Reduction of water pressure head due to distance of windows from the ship's side and due to height above deck level, in the case of windows in front, is not taken into account.

NOTE 4 — The calculated values for the height above the summer load waterline for the ordinates II and V and also ordinates III and IV differ only by about 0·5 to 1·0 m. The pairs of ordinates are, therefore, combined in respective curves in each graph.